



MARK A. YOUNG
EXECUTIVE DIRECTOR

LOWELL REGIONAL WASTEWATER UTILITY

WASTEWATER COLLECTION AND TREATMENT



SERVING LOWELL
CHELMSFORD
DRACUT
TEWKSBURY
TYNGSBORO

April 15, 2020

RE: MA0100633

To Whom It May Concern:

The following is an itemization of status and improvements for the Lowell Regional Wastewater Utility during March 2020. Enclosed is a copy of the Discharge Monitoring Report, Down Stream Notification Reports, and required NPDES permit monitoring data for this period.

The Discharge Monitoring Report is being submitted electronically through the Environmental Protection Agency NetDMR website and also via email to the Massachusetts Department of Environmental Protection.

PERMIT EXCEEDANCES:

- There were no permit exceedances for the month of March 2020.

PROCESS CHANGES AND IMPROVEMENTS:

- The primary and secondary clarifiers are undergoing a complete upgrade as part of the phase 2B construction project. This has limited flow through the facility and impacted wet weather flow capacity.
 - Primary Clarifier No.6 was taken offline for construction on 2/27.
 - Primary Clarifier No.3 was taken offline for construction on 3/26.
 - Secondary Clarifier No.2 was taken offline for construction on 3/2.
- Anoxic periods in the last cell of the aeration system have been disabled due to the fact that it is not currently needed for NO₃ control.
- A new temporary Centrisys centrifuge was commissioned on 3/18. This has replaced the previous temporary Pace centrifuge. The new unit provides for a more reliable dewatering process, which also produces a drier sludge cake.
- Thickened Waste Pump No. 744 was replaced with a temporary progressive cavity pump on 6/14/19. This is being done as part of a new sludge pump technology trial.
- The sodium bisulfite feed system is being upgraded as part of the Phase 2B construction project. The system, including the pumps, was fully upgraded and brought online 1/10.
 - There have been operational and equipment issues associated with the new sodium bisulfite feed system since startup. These issues have resulted in the final Cl₂ residual

spiking several times for short durations. This can be seen in the included final Cl_2 residual monitoring chart. The contractor is working to resolve the problems.

- The new bisulfite feed system was turned off and operation of the old bisulfite feed system is being used until the new feed system issues are resolved.
- The Duck Island SCADA system is being upgraded as part of the Phase 2B construction project. This upgrade will enhance the control, automation, and data collection capabilities of the SCADA system.
 - The Utility has been in the process of transitioning to the new system, which went live on 9/27.

ODOR COMPLAINTS:

- There were no reported odor complaints during this period.

Respectfully,



Aaron Fox, Operations Manager
Lowell Regional Wastewater Utility
First St. Blvd. (Rt. 110)
Lowell MA 01850

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

Form Approved.
OMB No. 2040-0004

DISCHARGE MONITORING REPORT (DMR)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)

NAME: LOWELL REGIONAL WW UTILITY
ADDRESS: 451 FIRST ST BLVD
LOWELL, MA 01850
FACILITY: LOWELL REGIONAL WW UTILITY
LOCATION: 451 FIRST ST BLVD
LOWELL, MA 01850

MA0100633
PERMIT NUMBER

035-A
DISCHARGE NUMBER

DMR MAILING ZIP CODE: 01850
MAJOR \$
(SUBR E)
TREATED EFFLUENT
External Outfall

ATTN: AARON FOX, OPERATIONS MANAGER

FROM

| MONITORING PERIOD | | | |
|-------------------|----|------------|--|
| MM/DD/YYYY | | MM/DD/YYYY | |
| 03/01/2020 | TO | 03/31/2020 | |

TO

NO DISCHARGE

| PARAMETER | | QUANTITY OR LOADING | | | | QUALITY OR CONCENTRATION | | | | NO. EX | FREQUENCY OF ANALYSIS | SAMPLE TYPE |
|----------------------------------|--------------------|---------------------|--------------------|-----------------------|-------|--------------------------|----------------|------------------------|-------|--------|-----------------------|-------------|
| | | VALUE 1 | VALUE 2 | VALUE 3 | UNITS | VALUE 1 | VALUE 2 | VALUE 3 | UNITS | | | |
| pH | SAMPLE MEASUREMENT | ***** | ***** | ***** | ***** | 6.7 | ***** | 7.1 | SU | 0 | 01/01 | GR |
| 00400 1 0 Effluent Gross | PERMIT REQUIREMENT | ***** | ***** | ***** | ***** | 6.0 MINIMUM | ***** | 8.3 MAXIMUM | SU | | Daily | GRAB |
| Solids, total suspended | SAMPLE MEASUREMENT | 2,469 | 4,382 | 14,374 | lb/d | 8.2 | 12.60 | 33.4 | mg/L | 0 | 05/07 | 24 |
| 00530 1 0 Effluent Gross | PERMIT REQUIREMENT | 8,006 MO AVG | 12,010 WKLY AVG | Req. Mon. DAILY MX | lb/d | 30 MO AVG | 45 WKLY AVG | Req. Mon. DAILY MAX | mg/L | | Weekdays | COMP24 |
| Solids, total suspended | SAMPLE MEASUREMENT | 40,804 | ***** | ***** | lb/d | 152.4 | ***** | ***** | mg/L | 0 | 05/07 | 24 |
| 00530 G 0 Raw Sewage Influent | PERMIT REQUIREMENT | Req. Mon. MO AVG | ***** | ***** | lb/d | Req. Mon. MO AVG | ***** | ***** | mg/L | | Weekdays | COMP24 |
| TSS % Removal | SAMPLE MEASUREMENT | ***** | ***** | ***** | ***** | 96.9 | ***** | ***** | % | 0 | 01/30 | CA |
| | PERMIT REQUIREMENT | ***** | ***** | ***** | ***** | 85 MINIMUM | ***** | ***** | % | | Monthly | CALC |
| Total Nitrogen | SAMPLE MEASUREMENT | ***** | ***** | ***** | ***** | 22.67 | ***** | ***** | mg/L | 0 | 01/30 | CA |
| Effluent Gross | PERMIT REQUIREMENT | ***** | ***** | ***** | ***** | Req. Mon. MO AVG | ***** | ***** | mg/L | | Monthly | CALC |
| TKN | SAMPLE MEASUREMENT | ***** | ***** | ***** | ***** | 21.10 | ***** | ***** | mg/L | 0 | 01/30 | 24 |
| Effluent Gross | PERMIT REQUIREMENT | ***** | ***** | ***** | ***** | Req. Mon. MO AVG | ***** | ***** | mg/L | | Monthly | COMP24 |
| NO3,2-N | SAMPLE MEASUREMENT | ***** | ***** | ***** | ***** | 1.57 | ***** | ***** | mg/L | 0 | 01/30 | 24 |
| Effluent Gross | PERMIT REQUIREMENT | ***** | ***** | ***** | ***** | Req. Mon. MO AVG | ***** | ***** | mg/L | | Monthly | COMP24 |
| Phosphorus, total (as P) | SAMPLE MEASUREMENT | ***** | ***** | ***** | ***** | 0.90 | ***** | 0.90 | mg/L | 0 | 01/30 | 24 |
| 00665 1 0 Effluent Gross | PERMIT REQUIREMENT | ***** | ***** | ***** | ***** | Req. Mon. MO AVG | ***** | Req. Mon. DAILY MX | mg/L | | Monthly | COMP24 |

| | | | | |
|--|---|--------------|--------|------------|
| NAME/TITLE PRINCIPAL EXECUTIVE OFFICER | I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. | TELEPHONE | | DATE |
| AARON FOX OPERATIONS SUPERINTENDENT | | 978 674-4248 | | 04/14/2020 |
| TYPED OR PRINTED | | AREA CODE | NUMBER | MM/DD/YYYY |



SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

Form Approved.
OMB No. 2040-0004

DISCHARGE MONITORING REPORT (DMR)

PERMITTEE NAME/ADDRESS (Include Facility Name/Location if Different)

NAME: LOWELL REGIONAL WW UTILITY
ADDRESS: 451 FIRST ST BLVD
LOWELL, MA 01850
FACILITY: LOWELL REGIONAL WW UTILITY
LOCATION: 451 FIRST ST BLVD
LOWELL, MA 01850

| |
|---------------|
| MA0100633 |
| PERMIT NUMBER |

| |
|------------------|
| 035-A |
| DISCHARGE NUMBER |

DMR MAILING ZIP CODE: 01850
MAJOR \$
(SUBR E)
TREATED EFFLUENT
External Outfall

ATTN: AARON FOX, OPERATIONS MANAGER


FROM

| MONITORING PERIOD | | | |
|-------------------|----|------------|--|
| MM/DD/YYYY | | MM/DD/YYYY | |
| 03/01/2020 | TO | 03/31/2020 | |

TO

NO DISCHARGE

| PARAMETER | | QUANTITY OR LOADING | | | | QUALITY OR CONCENTRATION | | | | NO. EX | FREQUENCY OF ANALYSIS | SAMPLE TYPE |
|--|--------------------|---------------------|--------------------|-----------------------|-------|--------------------------|----------------|-----------------------|-----------|--------|-----------------------|-------------|
| | | VALUE 1 | VALUE 2 | VALUE 3 | UNITS | VALUE 1 | VALUE 2 | VALUE 3 | UNITS | | | |
| Flow, in conduit or thru treatment plant | SAMPLE MEASUREMENT | 27.85 | 29.61 | 57.45 | MGD | ***** | ***** | ***** | ***** | 0 | 99/99 | RC |
| 50050 1 0 Effluent Gross | PERMIT REQUIREMENT | 32 12MO AVG | Req. Mon MO AVG | Req. Mon. DAILY MX | MGD | ***** | ***** | ***** | ***** | | Continuous | RCORDR |
| Chlorine, total residual | SAMPLE MEASUREMENT | ***** | ***** | ***** | ***** | 54.84 | ***** | 230 | ug/L | 0 | 01/01 | GR |
| 50060 1 0 Effluent Gross | PERMIT REQUIREMENT | ***** | ***** | ***** | ***** | 196 MO AVG | ***** | 338 DAILY MX | ug/L | | Daily | GRAB |
| Chlorine, total residual | SAMPLE MEASUREMENT | ***** | ***** | ***** | ***** | 52.26 | ***** | 340 | ug/L | 0 | 99/99 | RC |
| 50060 0 0 Intake | PERMIT REQUIREMENT | ***** | ***** | ***** | ***** | Req. Mon. MO AVG | ***** | Req. Mon. DAILY MX | ug/L | | Continuous | RCORDR |
| Ecoli | SAMPLE MEASUREMENT | ***** | ***** | ***** | ***** | 2.87 | ***** | 228 | MPN/100ml | 0 | 05/07 | GR |
| Effluent Gross | PERMIT REQUIREMENT | ***** | ***** | ***** | ***** | 126 MO GEO | ***** | 409 DAILY MX | MPN/100ml | | Weekdays | GRAB |
| BOD, carbonaceous, 05 day, 20C | SAMPLE MEASUREMENT | 2,171 | 4,833 | 17,920 | lb/d | 7.0 | 12.94 | 37.4 | mg/L | 0 | 05/07 | 24 |
| 80082 1 0 Effluent Gross | PERMIT REQUIREMENT | 6,672 MO AVG | 10,675 WKLY AVG | Req. Mon. DAILY MX | lb/d | 25 MO AVG | 40 WKLY AVG | Req. Mon. DAILY MX | mg/L | | Weekdays | COMP24 |
| BOD, carbonaceous, 05 day, 20C | SAMPLE MEASUREMENT | 43,630 | ***** | ***** | lb/d | 169.7 | ***** | ***** | mg/L | 0 | 05/07 | 24 |
| 80082 G 0 Raw Sewage Influent | PERMIT REQUIREMENT | Req. Mon. MO AVG | ***** | ***** | lb/d | Req. Mon. MO AVG | ***** | ***** | mg/L | | Weekdays | COMP24 |
| BOD % Removal | SAMPLE MEASUREMENT | ***** | ***** | ***** | ***** | 97.7 | ***** | ***** | % | 0 | 01/30 | CA |
| Effluent | PERMIT REQUIREMENT | ***** | ***** | ***** | ***** | 85 MINIMUM | ***** | ***** | % | | Monthly | CALC |

| | | | | |
|--|---|---|--------|------------|
| NAME/TITLE PRINCIPAL EXECUTIVE OFFICER | I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. | TELEPHONE | | DATE |
| AARON FOX | |  | | 04/14/2020 |
| OPERATIONS SUPERINTENDENT | | | | |
| TYPED OR PRINTED | | SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT | | MM/DD/YYYY |
| | | AREA CODE | NUMBER | |

Lowell Regional Wastewater Utility

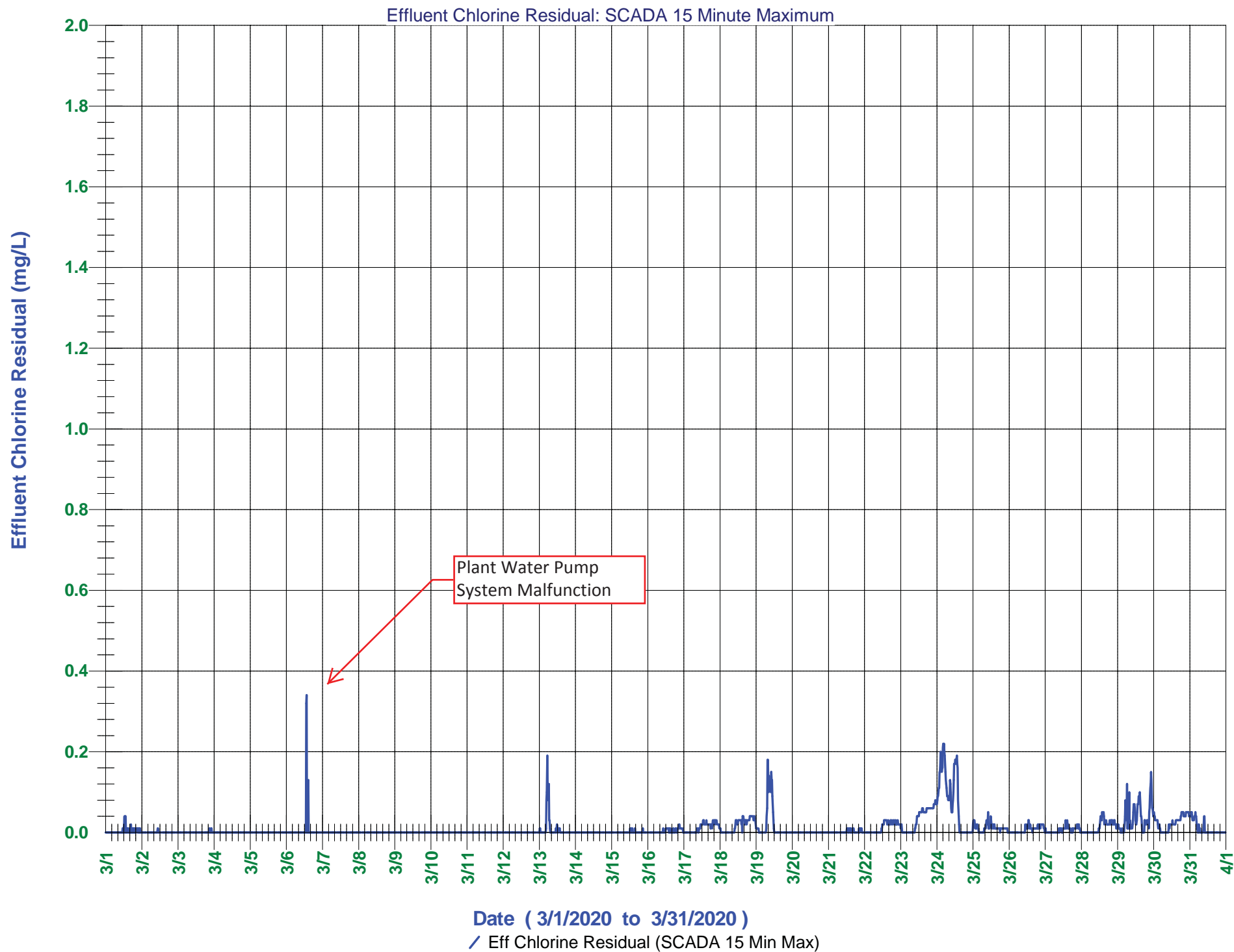
NPDES Report (Permit NO. MA0100633)

March 2020

Printed on Tue Apr 14 2020

| Date | Plant Effluent Flow | | | D.O. | Chlorine Residual | Chlorine Residual Continuous Recording | | Plant Effluent pH | | | E-coli (cfu/100 ml) | Effluent CBOD | | | Effluent TSS | | |
|--------|---------------------|-------------------|-------------------|------|-------------------|--|-------------|-------------------|------|------|------------------------|---------------|----------|---------|--------------|----------|---------|
| | Total (MG) | Max. Hourly (MGD) | Min. Hourly (MGD) | | | Avg. (mg/L) | Max. (mg/L) | Min. | Max. | Grab | | (mg/L) | (lbs) | (% Rem) | (mg/L) | (lbs) | (% Rem) |
| 01-Sun | 28.42 | 34.94 | 20.25 | 9.4 | 0.01 | 0.00 | 0.04 | 6.8 | 7.0 | 7.0 | | 4.8 | 1,137.7 | 97.10 | 9.3 | 2,204.3 | 96.36 |
| 02-Mon | 28.10 | 33.74 | 20.06 | 8.7 | 0.02 | 0.00 | 0.01 | 6.9 | 7.0 | 7.1 | 5 | 4.1 | 960.9 | 97.64 | 5.6 | 1,312.4 | 97.05 |
| 03-Tue | 28.10 | 33.35 | 21.15 | 10.6 | 0.07 | 0.00 | 0.01 | 6.8 | 7.0 | 6.8 | 10 | 3.8 | 890.7 | | 4.2 | 984.4 | |
| 04-Wed | 27.62 | 32.03 | 20.81 | 9.3 | 0.11 | 0.00 | 0.00 | 6.9 | 7.0 | 6.9 | 1 | 4.3 | 990.6 | | 4.9 | 1,128.8 | |
| 05-Thu | 26.87 | 31.81 | 19.93 | 9.3 | 0.15 | 0.00 | 0.00 | 6.9 | 7.0 | 6.9 | 1 | 3.7 | 829.3 | 99.12 | 5.0 | 1,120.6 | 96.47 |
| 06-Fri | 26.54 | 30.01 | 19.11 | 10.0 | 0.07 | 0.00 | 0.34 | 6.6 | 7.0 | 7.1 | 1 | | | | | | |
| 07-Sat | 26.38 | 32.90 | 18.81 | 9.6 | 0.01 | 0.00 | 0.00 | 6.8 | 7.0 | 7.1 | | | | | | | |
| 08-Sun | 25.24 | 32.39 | 18.38 | 9.4 | 0.00 | 0.00 | 0.00 | 6.8 | 7.0 | 7.1 | | 4.2 | 883.9 | 97.39 | 4.0 | 841.8 | 97.72 |
| 09-Mon | 25.52 | 30.70 | 18.78 | 9.2 | 0.01 | 0.00 | 0.00 | 6.9 | 7.0 | 7.0 | 0 | 3.4 | 723.6 | 98.94 | 3.4 | 723.6 | 97.98 |
| 10-Tue | 25.14 | 29.68 | 18.50 | 7.6 | 0.01 | 0.00 | 0.00 | 6.8 | 7.0 | 7.1 | 1 | 2.8 | 587.1 | 98.74 | 3.0 | 629.1 | 97.94 |
| 11-Wed | 25.08 | 30.08 | 17.94 | 7.4 | 0.01 | 0.00 | 0.00 | 6.9 | 7.0 | 7.0 | 4 | 3.0 | 627.5 | 98.45 | 3.6 | 753.0 | 97.80 |
| 12-Thu | 25.28 | 29.83 | 17.89 | 8.6 | 0.02 | 0.00 | 0.00 | 6.9 | 7.0 | 7.1 | 4 | 6.9 | 1,454.8 | 97.18 | 6.3 | 1,328.3 | 95.74 |
| 13-Fri | 31.89 | 51.44 | 21.57 | 8.5 | 0.07 | 0.01 | 0.19 | 6.7 | 7.0 | 7.0 | 3 | | | | | | |
| 14-Sat | 26.18 | 31.83 | 18.46 | 8.4 | 0.05 | 0.00 | 0.00 | 6.8 | 6.9 | 7.0 | | | | | | | |
| 15-Sun | 26.05 | 32.39 | 18.03 | 8.4 | 0.00 | 0.00 | 0.01 | 6.8 | 6.9 | 7.0 | | 3.5 | 760.3 | 98.02 | 4.2 | 912.4 | 97.68 |
| 16-Mon | 25.19 | 29.41 | 17.53 | 8.6 | 0.03 | 0.00 | 0.02 | 6.8 | 6.9 | 7.0 | 4 | 4.4 | 924.5 | 97.67 | 5.1 | 1,071.6 | 97.41 |
| 17-Tue | 24.62 | 30.25 | 18.26 | 8.5 | 0.01 | 0.01 | 0.03 | 6.8 | 6.9 | 7.1 | 6 | 4.2 | 862.5 | | 4.5 | 924.1 | |
| 18-Wed | 25.75 | 29.75 | 17.63 | 8.0 | 0.02 | 0.01 | 0.04 | 6.8 | 7.0 | 6.9 | 3 | 3.4 | 730.0 | 97.64 | 3.4 | 730.0 | 97.72 |
| 19-Thu | 37.40 | 68.12 | 17.50 | 9.0 | 0.21 | 0.02 | 0.18 | 6.6 | 6.9 | 7.1 | 228 | 14.4 | 4,492.0 | | 14.6 | 4,554.3 | |
| 20-Fri | 25.49 | 30.77 | 19.74 | 11.2 | 0.05 | 0.00 | 0.00 | 6.7 | 6.9 | 6.9 | 1 | | | | | | |
| 21-Sat | 26.60 | 31.02 | 18.19 | 10.8 | 0.06 | 0.00 | 0.01 | 6.8 | 6.9 | 7.1 | | | | | | | |
| 22-Sun | 24.77 | 31.11 | 16.92 | 10.2 | 0.01 | 0.01 | 0.03 | 6.8 | 6.9 | 7.0 | | 5.0 | 1,032.7 | 96.56 | 6.8 | 1,404.5 | 97.24 |
| 23-Mon | 26.01 | 37.89 | 16.78 | 9.8 | 0.03 | 0.03 | 0.08 | 6.8 | 6.9 | 7.1 | 5 | 14.7 | 3,188.9 | | 17.0 | 3,687.8 | |
| 24-Tue | 57.45 | 73.35 | 37.88 | 10.4 | 0.23 | 0.07 | 0.22 | 6.6 | 6.9 | 6.9 | | 37.4 | 17,919.6 | | 30.0 | 14,374.0 | |
| 25-Wed | 32.39 | 36.15 | 26.12 | 11.0 | 0.07 | 0.01 | 0.05 | 6.7 | 6.8 | 6.9 | 3 | 4.4 | 1,188.6 | 97.53 | 4.9 | 1,323.7 | 94.73 |
| 26-Thu | 31.21 | 36.63 | 24.38 | 10.6 | 0.11 | 0.01 | 0.03 | 6.7 | 6.9 | 6.9 | 2 | 3.2 | 833.0 | 97.20 | 4.3 | 1,119.3 | 96.74 |
| 27-Fri | 30.25 | 33.82 | 25.47 | 9.9 | 0.00 | 0.00 | 0.03 | 6.7 | 6.8 | 7.0 | 0 | | | | | | |
| 28-Sat | 28.98 | 34.80 | 21.89 | 10.1 | 0.00 | 0.01 | 0.05 | 6.7 | 6.8 | 7.0 | 0 | | | | | | |
| 29-Sun | 44.69 | 66.89 | 26.49 | 10.7 | 0.05 | 0.03 | 0.15 | 6.6 | 6.8 | 6.9 | | 17.1 | 6,372.8 | | 33.4 | 12,447.6 | |
| 30-Mon | 40.75 | 60.68 | 31.37 | 10.9 | 0.10 | 0.02 | 0.05 | 6.5 | 6.8 | 6.7 | 5 | 4.4 | 1,495.5 | | 4.9 | 1,665.4 | |
| 31-Tue | 33.83 | 39.22 | 29.84 | 11.5 | 0.11 | 0.01 | 0.05 | 6.6 | 6.7 | 6.8 | 2 | 3.7 | 1,044.0 | 96.16 | 5.5 | 1,551.9 | 94.37 |
| Min | 24.62 | 29.41 | 16.78 | 7.4 | 0.00 | 0.00 | 0.00 | 6.5 | 6.7 | 6.7 | 0 | 2.8 | 587 | 96.2 | 3.0 | 629 | 94.4 |
| Max | 57.45 | 73.35 | 37.88 | 11.5 | 0.23 | 0.07 | 0.34 | 6.9 | 7.0 | 7.1 | 228 | 37.4 | 17,920 | 99.1 | 33.4 | 14,374 | 98.0 |
| Avg | 29.61 | 37.64 | 21.15 | 9.5 | 0.05 | 0.008 | 0.05 | | | | 13 | 7.0 | 2,171 | 97.7 | 8.2 | 2,469 | 96.9 |
| Total | 917.81 | | | | | | | | | 3 | | 49,931 | | | | 56,793 | |

Lowell Regional Wastewater Utility - MA0100633



Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Fri, Mar 13, 2020

Dear Environmental Professionals and Interested Parties:

This report describes high-flow treatment performed at Lowell's Duck Island Clean Water Facility, as well as discharges of untreated Combined Sewer Overflows (CSOs) at the Utility's diversion structures.

High-flow treatment refers to combined stormwater and sewage that receives screening and clarification before being mixed with water receiving biological treatment. This mixture is then disinfected and discharged into the Merrimack River in full compliance with secondary treatment standards.

CSO diversions are an untreated mixture of stormwater and dilute sewage that is discharged directly into nearby receiving waters when the capacity of the treatment and transport systems are exceeded as a result of heavy rain. These diversions occur only when necessary to protect public health and safety.

Please refer to the final two pages of this report for an explanation of terms.

| Wastewater Flow to Duck Island | | |
|-----------------------------------|-----------------------------------|--|
| Daily Flow Rate (MGD) | Peak Hourly Flow Rate (MGD) | Instantaneous Peak Flow Rate (MGD) |
| 33.68 | 53.85 | 68.21 |

| | Rainfall | | | |
|--------------|---------------------------|---------------------------|-----------------------------------|----------------------------------|
| | Daily Rainfall (in) | Duration Total (hr) | Max Hourly Rainfall (in/hr) | Peak Intensity (in/15-min) |
| River's Edge | 0.36 | 11 | 0.11 | 0.03 |
| Warren | 0.39 | 11 | 0.10 | 0.04 |

Rain data may be inaccurate during cold weather

| High-Flow Treatment Summary | |
|--------------------------------|----------------|
| Duration (Minutes) | Volume (MG) |
| 106 | 0.80 |

| Combined Sewer Overflows Summary | |
|-------------------------------------|----------------|
| Duration (Minutes) | Volume (MG) |
| 0 | 0.00 |

Person Reporting Event: Gordon Bergeron - Lowell Water Engineering

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Fri, Mar 13, 2020

| High-Flow Treatment Duck Island | | | |
|------------------------------------|-----------------------|----------------|---------------------|
| Time | Duration (Minutes) | Volume (MG) | Warren Rain (in) |
| 01:00 | | | |
| 02:00 | | | 0.02 |
| 03:00 | | | 0.01 |
| 04:00 | | | 0.10 |
| 05:00 | | | 0.10 |
| 06:00 | 51 | 0.46 | 0.04 |
| 07:00 | 55 | 0.34 | 0.02 |
| 08:00 | | | |
| 09:00 | | | 0.01 |
| 10:00 | | | 0.01 |
| 11:00 | | | 0.03 |
| 12:00 | | | 0.03 |
| 13:00 | | | |
| 14:00 | | | |
| 15:00 | | | |
| 16:00 | | | |
| 17:00 | | | 0.02 |
| 18:00 | | | |
| 19:00 | | | |
| 20:00 | | | |
| 21:00 | | | |
| 22:00 | | | |
| 23:00 | | | |
| 24:00 | | | |

| Barasford Station Diversion to Merrimack River | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
| 12:00 | | |
| 13:00 | | |
| 14:00 | | |
| 15:00 | | |
| 16:00 | | |
| 17:00 | | |
| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Beaver Brook Station Diversion to Beaver Brook | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
| 12:00 | | |
| 13:00 | | |
| 14:00 | | |
| 15:00 | | |
| 16:00 | | |
| 17:00 | | |
| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| High-Flow Treatment Duck Island | | | |
|------------------------------------|--------------------------------|-------------------------|---------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) | Total Rainfall (in) |
| | 106 | 0.80 | 0.39 |

| Barasford Station To Merrimack River | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Beaver Brook Station To Beaver Brook | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Fri, Mar 13, 2020

| Merrimack Station Diversion to Merrimack River | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
| 12:00 | | |
| 13:00 | | |
| 14:00 | | |
| 15:00 | | |
| 16:00 | | |
| 17:00 | | |
| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Read Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Tilden Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Merrimack Station To Merrimack River | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | 0 | |

| Read Station To Merrimack River | | |
|------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Tilden Station To Merrimack River | | |
|--------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Fri, Mar 13, 2020

| Walker Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
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| 15:00 | | |
| 16:00 | | |
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| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Warren Station Diversion to Concord River | | | |
|---|-----------------------|----------------|---------------------|
| Time | Duration (Minutes) | Volume (MG) | Warren Rain (in) |
| 01:00 | | | |
| 02:00 | | | 0.02 |
| 03:00 | | | 0.01 |
| 04:00 | | | 0.10 |
| 05:00 | | | 0.10 |
| 06:00 | | | 0.04 |
| 07:00 | | | 0.02 |
| 08:00 | | | |
| 09:00 | | | 0.01 |
| 10:00 | | | 0.01 |
| 11:00 | | | 0.03 |
| 12:00 | | | 0.03 |
| 13:00 | | | |
| 14:00 | | | |
| 15:00 | | | |
| 16:00 | | | |
| 17:00 | | | 0.02 |
| 18:00 | | | |
| 19:00 | | | |
| 20:00 | | | |
| 21:00 | | | |
| 22:00 | | | |
| 23:00 | | | |
| 24:00 | | | |

| West Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
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| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Walker Station To Merrimack River | | |
|--------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Warren Station To Concord River | | | |
|------------------------------------|--------------------------------|-------------------------|---------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) | Total Rainfall (in) |
| | | | 0.39 |

| West Station To Merrimack River | | |
|------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Fri, Mar 13, 2020

Definitions and Abbreviations:

Flow Reporting Terms:

MG:

Volume in million gallons, (e.g. 2 MG = 2 million gallons)

MGD:

Flow rate in million gallons per day (e.g. a rate of 1 MGD sustained for 1 day would result in a volume of 1 MG)

Daily Flow Rate, million gallons per day (MGD):

Million gallons of flow treated at Duck Island

Peak Hourly Flow Rate (MGD):

The highest flow rate treated at Duck Island over a rolling one-hour period

Instantaneous Peak Flow Rate (MGD):

The highest flow rate treated at Duck Island at any moment of the day

Duration (Minutes):

Number of minutes in a given hour or over the course of the day a flow was measured

Weather Reporting Terms:

Rainfall Measurement:

Rainfall is measured by Lowell's network of rain gauges

Daily Rainfall, inches (in):

The total depth of rainfall measured by each rain gauge over the course of the day

Maximum Hourly Rainfall (in/hr):

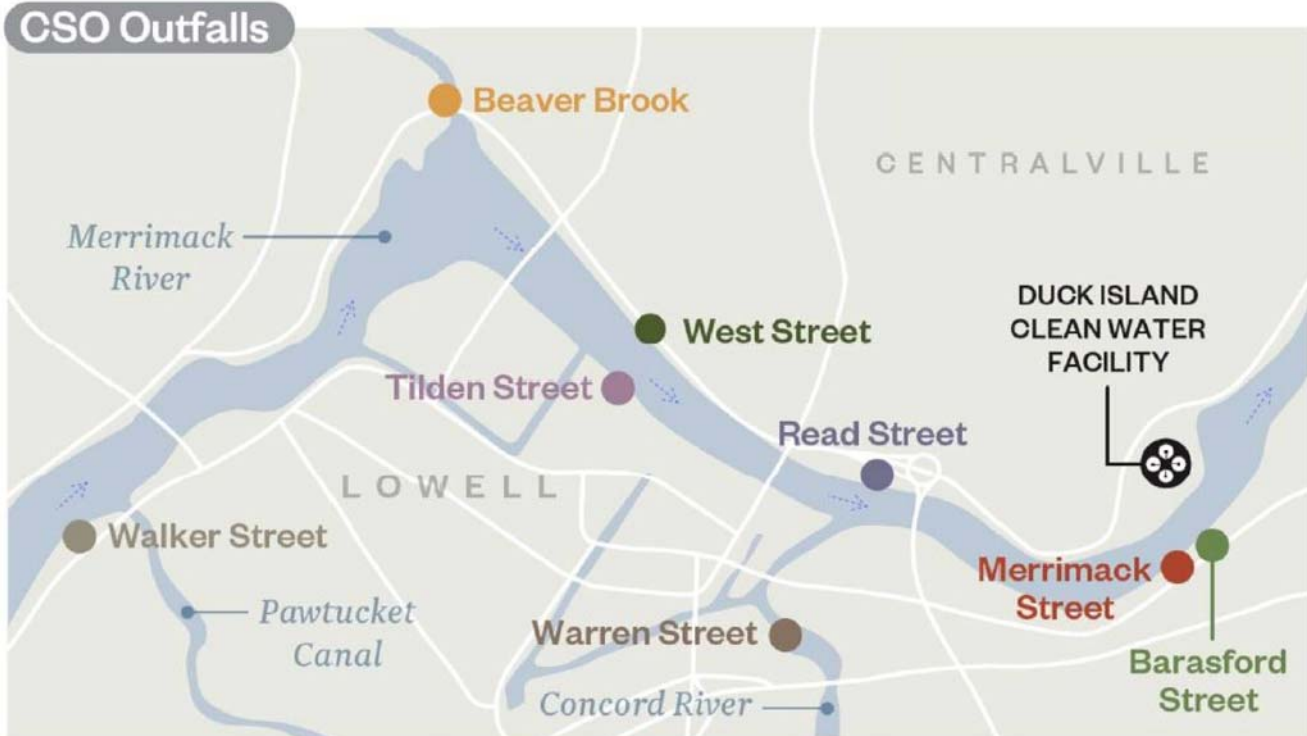
The greatest total depth of rainfall measured by a rain gauge in one hour

Peak Intensity, inches per 15 minutes (in/15-min):

The greatest total depth of rainfall received in any 15-minute period.

Duration (Hour):

The number of hours in the day during which it rained.



Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Thu, Mar 19, 2020

Dear Environmental Professionals and Interested Parties:

This report describes high-flow treatment performed at Lowell's Duck Island Clean Water Facility, as well as discharges of untreated Combined Sewer Overflows (CSOs) at the Utility's diversion structures.

High-flow treatment refers to combined stormwater and sewage that receives screening and clarification before being mixed with water receiving biological treatment. This mixture is then disinfected and discharged into the Merrimack River in full compliance with secondary treatment standards.

CSO diversions are an untreated mixture of stormwater and dilute sewage that is discharged directly into nearby receiving waters when the capacity of the treatment and transport systems are exceeded as a result of heavy rain. These diversions occur only when necessary to protect public health and safety.

Please refer to the final two pages of this report for an explanation of terms.

| Wastewater Flow to Duck Island | | |
|--------------------------------|-----------------------------|------------------------------------|
| Daily Flow Rate (MGD) | Peak Hourly Flow Rate (MGD) | Instantaneous Peak Flow Rate (MGD) |
| 38.63 | 68.68 | 72.64 |

| | Rainfall | | | |
|--------------|---------------------|---------------------|-----------------------------|----------------------------|
| | Daily Rainfall (in) | Duration Total (hr) | Max Hourly Rainfall (in/hr) | Peak Intensity (in/15-min) |
| River's Edge | 0.57 | 11 | 0.14 | 0.04 |
| Warren | 0.61 | 12 | 0.14 | 0.04 |

Rain data may be inaccurate during cold weather

| High-Flow Treatment Summary | |
|-----------------------------|-------------|
| Duration (Minutes) | Volume (MG) |
| 387 | 4.80 |

| Combined Sewer Overflows Summary | |
|----------------------------------|-------------|
| Duration (Minutes) | Volume (MG) |
| | 0.00 |

Person Reporting Event: Gordon Bergeron - Lowell Water Engineering

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Thu, Mar 19, 2020

| High-Flow Treatment Duck Island | | | |
|------------------------------------|-----------------------|----------------|---------------------|
| Time | Duration (Minutes) | Volume (MG) | Warren Rain (in) |
| 01:00 | | | |
| 02:00 | | | |
| 03:00 | | | |
| 04:00 | | | |
| 05:00 | | | |
| 06:00 | | | 0.04 |
| 07:00 | | | 0.14 |
| 08:00 | 17 | 0.36 | 0.10 |
| 09:00 | 60 | 0.85 | 0.07 |
| 10:00 | 60 | 0.84 | 0.12 |
| 11:00 | 60 | 0.98 | 0.05 |
| 12:00 | 60 | 0.83 | 0.01 |
| 13:00 | 60 | 0.60 | 0.03 |
| 14:00 | 60 | 0.29 | 0.01 |
| 15:00 | 10 | 0.05 | 0.02 |
| 16:00 | | | 0.01 |
| 17:00 | | | 0.01 |
| 18:00 | | | |
| 19:00 | | | |
| 20:00 | | | |
| 21:00 | | | |
| 22:00 | | | |
| 23:00 | | | |
| 24:00 | | | |

| Barasford Station Diversion to Merrimack River | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Beaver Brook Station Diversion to Beaver Brook | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| High-Flow Treatment Duck Island | | | |
|------------------------------------|--------------------------------|-------------------------|---------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) | Total Rainfall (in) |
| | 387 | 4.80 | 0.61 |

| Barasford Station To Merrimack River | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Beaver Brook Station To Beaver Brook | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Thu, Mar 19, 2020

| Merrimack Station Diversion to Merrimack River | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Read Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
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| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Tilden Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
| 12:00 | | |
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| 14:00 | | |
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| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Merrimack Station To Merrimack River | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Read Station To Merrimack River | | |
|------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Tilden Station To Merrimack River | | |
|--------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Thu, Mar 19, 2020

| Walker Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
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| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Warren Station Diversion to Concord River | | | |
|---|-----------------------|----------------|---------------------|
| Time | Duration (Minutes) | Volume (MG) | Warren Rain (in) |
| 01:00 | | | |
| 02:00 | | | |
| 03:00 | | | |
| 04:00 | | | |
| 05:00 | | | |
| 06:00 | | | 0.04 |
| 07:00 | | | 0.14 |
| 08:00 | | | 0.10 |
| 09:00 | | | 0.07 |
| 10:00 | | | 0.12 |
| 11:00 | | | 0.05 |
| 12:00 | | | 0.01 |
| 13:00 | | | 0.03 |
| 14:00 | | | 0.01 |
| 15:00 | | | 0.02 |
| 16:00 | | | 0.01 |
| 17:00 | | | 0.01 |
| 18:00 | | | |
| 19:00 | | | |
| 20:00 | | | |
| 21:00 | | | |
| 22:00 | | | |
| 23:00 | | | |
| 24:00 | | | |

| West Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
| 12:00 | | |
| 13:00 | | |
| 14:00 | | |
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| 16:00 | | |
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| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Walker Station To Merrimack River | | |
|--------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Warren Station To Concord River | | | |
|------------------------------------|--------------------------------|-------------------------|---------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) | Total Rainfall (in) |
| | | | 0.61 |

| West Station To Merrimack River | | |
|------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:
Thu, Mar 19, 2020

Definitions and Abbreviations:

Flow Reporting Terms:

MG:

Volume in million gallons, (e.g. 2 MG = 2 million gallons)

MGD:

Flow rate in million gallons per day (e.g. a rate of 1 MGD sustained for 1 day would result in a volume of 1 MG)

Daily Flow Rate, million gallons per day (MGD):

Million gallons of flow treated at Duck Island

Peak Hourly Flow Rate (MGD):

The highest flow rate treated at Duck Island over a rolling one-hour period

Instantaneous Peak Flow Rate (MGD):

The highest flow rate treated at Duck Island at any moment of the day

Duration (Minutes):

Number of minutes in a given hour or over the course of the day a flow was measured

Weather Reporting Terms:

Rainfall Measurement:

Rainfall is measured by Lowell's network of rain gauges

Daily Rainfall, inches (in):

The total depth of rainfall measured by each rain gauge over the course of the day

Maximum Hourly Rainfall (in/hr):

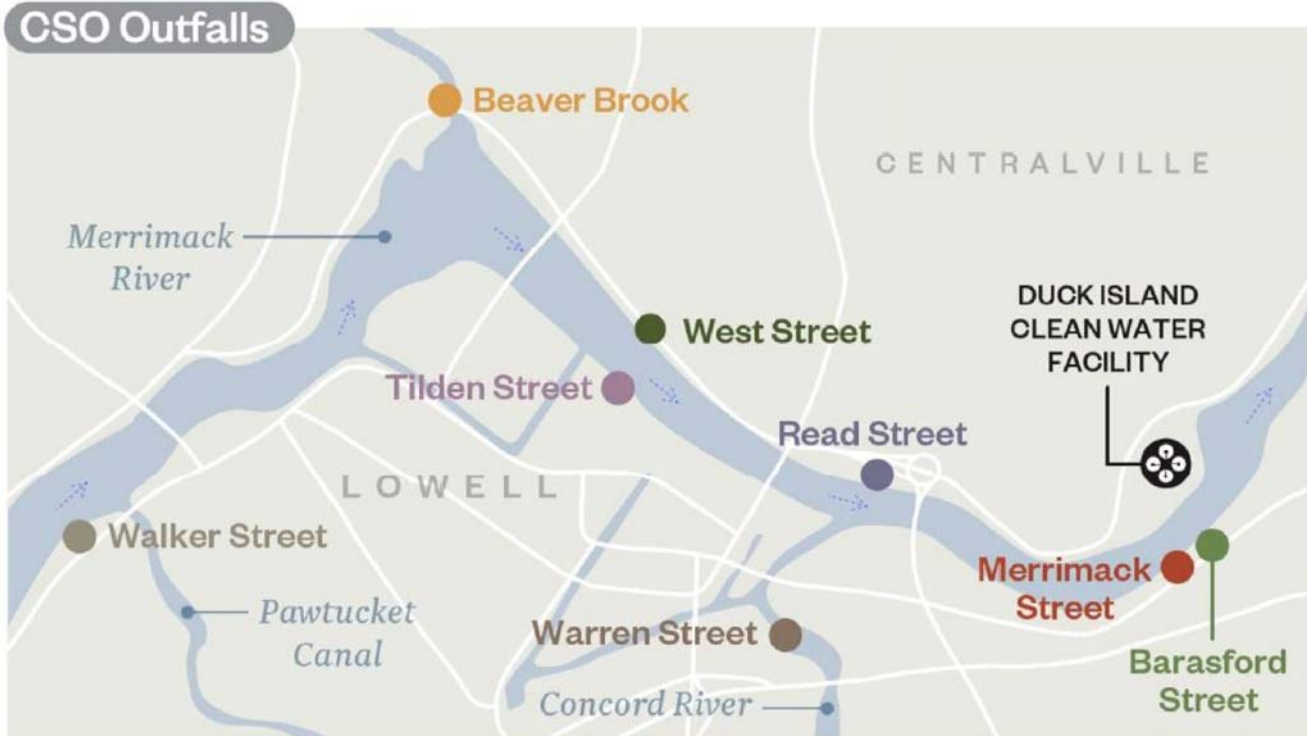
The greatest total depth of rainfall measured by a rain gauge in one hour

Peak Intensity, inches per 15 minutes (in/15-min):

The greatest total depth of rainfall received in any 15-minute period.

Duration (Hour):

The number of hours in the day during which it rained.



Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Tue, Mar 24, 2020

Dear Environmental Professionals and Interested Parties:

This report describes high-flow treatment performed at Lowell's Duck Island Clean Water Facility, as well as discharges of untreated Combined Sewer Overflows (CSOs) at the Utility's diversion structures.

High-flow treatment refers to combined stormwater and sewage that receives screening and clarification before being mixed with water receiving biological treatment. This mixture is then disinfected and discharged into the Merrimack River in full compliance with secondary treatment standards.

CSO diversions are an untreated mixture of stormwater and dilute sewage that is discharged directly into nearby receiving waters when the capacity of the treatment and transport systems are exceeded as a result of heavy rain. These diversions occur only when necessary to protect public health and safety.

Please refer to the final two pages of this report for an explanation of terms.

| Wastewater Flow to Duck Island | | |
|-----------------------------------|-----------------------------------|--|
| Daily Flow Rate (MGD) | Peak Hourly Flow Rate (MGD) | Instantaneous Peak Flow Rate (MGD) |
| 58.14 | 75.86 | 91.10 |

| | Rainfall | | | |
|--------------|---------------------------|---------------------------|-----------------------------------|----------------------------------|
| | Daily Rainfall (in) | Duration Total (hr) | Max Hourly Rainfall (in/hr) | Peak Intensity (in/15-min) |
| River's Edge | 1.17 | 12 | 0.18 | 0.06 |
| Warren | 1.34 | 11 | 0.30 | 0.09 |

Rain data may be inaccurate during cold weather

| High-Flow Treatment Summary | |
|--------------------------------|----------------|
| Duration (Minutes) | Volume (MG) |
| 1,260 | 15.51 |

| Combined Sewer Overflows Summary | |
|-------------------------------------|----------------|
| Duration (Minutes) | Volume (MG) |
| | |

Person Reporting Event: Gordon Bergeron - Lowell Water Engineering

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Tue, Mar 24, 2020

| High-Flow Treatment Duck Island | | | |
|------------------------------------|-----------------------|----------------|---------------------|
| Time | Duration (Minutes) | Volume (MG) | Warren Rain (in) |
| 01:00 | 34 | 0.29 | 0.14 |
| 02:00 | 60 | 0.92 | 0.16 |
| 03:00 | 60 | 1.00 | 0.14 |
| 04:00 | 60 | 0.98 | 0.06 |
| 05:00 | 60 | 1.05 | 0.06 |
| 06:00 | 60 | 0.97 | 0.04 |
| 07:00 | 60 | 0.88 | 0.03 |
| 08:00 | 60 | 0.93 | 0.03 |
| 09:00 | 60 | 1.30 | |
| 10:00 | 60 | 0.70 | 0.17 |
| 11:00 | 60 | 0.85 | 0.30 |
| 12:00 | 60 | 1.06 | 0.21 |
| 13:00 | 60 | 1.03 | |
| 14:00 | 60 | 0.99 | |
| 15:00 | 60 | 0.78 | |
| 16:00 | 60 | 0.48 | |
| 17:00 | 60 | 0.32 | |
| 18:00 | 60 | 0.26 | |
| 19:00 | 60 | 0.21 | |
| 20:00 | 60 | 0.17 | |
| 21:00 | 60 | 0.24 | |
| 22:00 | 26 | 0.10 | |
| 23:00 | | | |
| 24:00 | | | |

| Barasford Station Diversion to Merrimack River | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
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| 21:00 | | |
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| 23:00 | | |
| 24:00 | | |

| Beaver Brook Station Diversion to Beaver Brook | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
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| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| High-Flow Treatment Duck Island | | | |
|------------------------------------|--------------------------------|-------------------------|---------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) | Total Rainfall (in) |
| | 1,260 | 15.51 | 1.34 |

| Barasford Station To Merrimack River | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Beaver Brook Station To Beaver Brook | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Tue, Mar 24, 2020

| Merrimack Station Diversion to Merrimack River | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
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| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Read Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
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| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Tilden Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Merrimack Station To Merrimack River | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Read Station To Merrimack River | | |
|------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Tilden Station To Merrimack River | | |
|--------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Tue, Mar 24, 2020

| Walker Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Warren Station Diversion to Concord River | | | |
|---|-----------------------|----------------|---------------------|
| Time | Duration (Minutes) | Volume (MG) | Warren Rain (in) |
| 01:00 | | | 0.14 |
| 02:00 | | | 0.16 |
| 03:00 | | | 0.14 |
| 04:00 | | | 0.06 |
| 05:00 | | | 0.06 |
| 06:00 | | | 0.04 |
| 07:00 | | | 0.03 |
| 08:00 | | | 0.03 |
| 09:00 | | | |
| 10:00 | | | 0.17 |
| 11:00 | | | 0.30 |
| 12:00 | | | 0.21 |
| 13:00 | | | |
| 14:00 | | | |
| 15:00 | | | |
| 16:00 | | | |
| 17:00 | | | |
| 18:00 | | | |
| 19:00 | | | |
| 20:00 | | | |
| 21:00 | | | |
| 22:00 | | | |
| 23:00 | | | |
| 24:00 | | | |

| West Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
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| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Walker Station To Merrimack River | | |
|--------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Warren Station To Concord River | | | |
|------------------------------------|--------------------------------|-------------------------|---------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) | Total Rainfall (in) |
| | | | 1.34 |

| West Station To Merrimack River | | |
|------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:
Tue, Mar 24, 2020

Definitions and Abbreviations:

Flow Reporting Terms:

MG:

Volume in million gallons, (e.g. 2 MG = 2 million gallons)

MGD:

Flow rate in million gallons per day (e.g. a rate of 1 MGD sustained for 1 day would result in a volume of 1 MG)

Daily Flow Rate, million gallons per day (MGD):

Million gallons of flow treated at Duck Island

Peak Hourly Flow Rate (MGD):

The highest flow rate treated at Duck Island over a rolling one-hour period

Instantaneous Peak Flow Rate (MGD):

The highest flow rate treated at Duck Island at any moment of the day

Duration (Minutes):

Number of minutes in a given hour or over the course of the day a flow was measured

Weather Reporting Terms:

Rainfall Measurement:

Rainfall is measured by Lowell's network of rain gauges

Daily Rainfall, inches (in):

The total depth of rainfall measured by each rain gauge over the course of the day

Maximum Hourly Rainfall (in/hr):

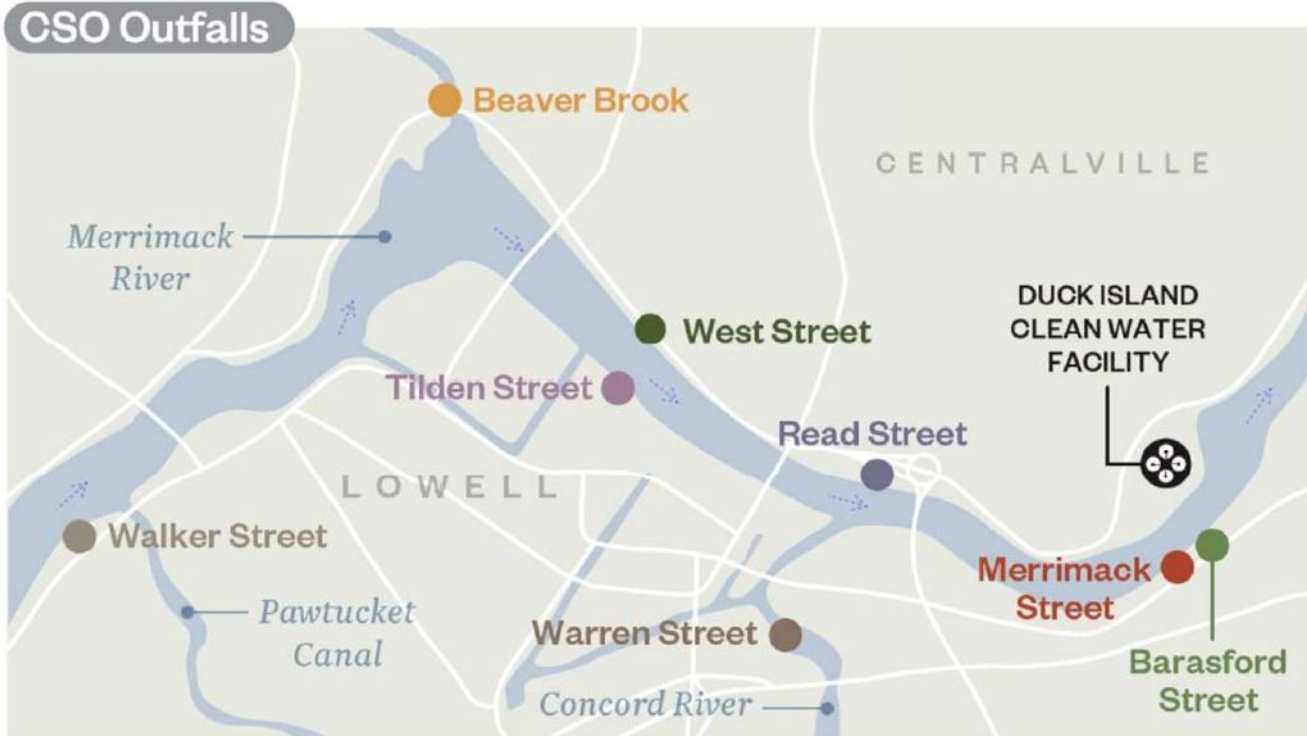
The greatest total depth of rainfall measured by a rain gauge in one hour

Peak Intensity, inches per 15 minutes (in/15-min):

The greatest total depth of rainfall received in any 15-minute period.

Duration (Hour):

The number of hours in the day during which it rained.



Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Sun, Mar 29, 2020

Dear Environmental Professionals and Interested Parties:

This report describes high-flow treatment performed at Lowell's Duck Island Clean Water Facility, as well as discharges of untreated Combined Sewer Overflows (CSOs) at the Utility's diversion structures.

High-flow treatment refers to combined stormwater and sewage that receives screening and clarification before being mixed with water receiving biological treatment. This mixture is then disinfected and discharged into the Merrimack River in full compliance with secondary treatment standards.

CSO diversions are an untreated mixture of stormwater and dilute sewage that is discharged directly into nearby receiving waters when the capacity of the treatment and transport systems are exceeded as a result of heavy rain. These diversions occur only when necessary to protect public health and safety.

Please refer to the final two pages of this report for an explanation of terms.

| Wastewater Flow to Duck Island | | |
|-----------------------------------|-----------------------------------|--|
| Daily Flow Rate (MGD) | Peak Hourly Flow Rate (MGD) | Instantaneous Peak Flow Rate (MGD) |
| 44.91 | 68.65 | 74.83 |

| | Rainfall | | | |
|--------------|---------------------------|---------------------------|-----------------------------------|----------------------------------|
| | Daily Rainfall (in) | Duration Total (hr) | Max Hourly Rainfall (in/hr) | Peak Intensity (in/15-min) |
| River's Edge | 0.77 | 22 | 0.15 | 0.11 |
| Warren | 0.89 | 23 | 0.20 | 0.17 |

Rain data may be inaccurate during cold weather

| High-Flow Treatment Summary | |
|--------------------------------|----------------|
| Duration (Minutes) | Volume (MG) |
| 736 | 8.15 |

| Combined Sewer Overflows Summary | |
|-------------------------------------|----------------|
| Duration (Minutes) | Volume (MG) |
| 31 | 0.53 |

Person Reporting Event: Gordon Bergeron - Lowell Water Engineering

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Sun, Mar 29, 2020

| High-Flow Treatment Duck Island | | | |
|------------------------------------|-----------------------|----------------|---------------------|
| Time | Duration (Minutes) | Volume (MG) | Warren Rain (in) |
| 01:00 | | | |
| 02:00 | | | 0.02 |
| 03:00 | | | 0.02 |
| 04:00 | | | 0.04 |
| 05:00 | | | 0.03 |
| 06:00 | | | 0.02 |
| 07:00 | | | 0.01 |
| 08:00 | | | 0.01 |
| 09:00 | | | 0.02 |
| 10:00 | | | 0.03 |
| 11:00 | | | 0.06 |
| 12:00 | 46 | 0.47 | 0.01 |
| 13:00 | 60 | 0.35 | 0.09 |
| 14:00 | 60 | 0.81 | 0.10 |
| 15:00 | 60 | 0.92 | 0.02 |
| 16:00 | 60 | 0.85 | 0.01 |
| 17:00 | 60 | 0.60 | 0.04 |
| 18:00 | 60 | 0.49 | 0.02 |
| 19:00 | 60 | 0.44 | 0.02 |
| 20:00 | 60 | 0.36 | 0.02 |
| 21:00 | 40 | 0.26 | 0.20 |
| 22:00 | 50 | 0.86 | 0.08 |
| 23:00 | 60 | 0.92 | 0.01 |
| 24:00 | 60 | 0.82 | 0.01 |

| Barasford Station Diversion to Merrimack River | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Beaver Brook Station Diversion to Beaver Brook | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| High-Flow Treatment Duck Island | | | |
|------------------------------------|--------------------------------|-------------------------|---------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) | Total Rainfall (in) |
| | 736 | 8.15 | 0.89 |

| Barasford Station To Merrimack River | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Beaver Brook Station To Beaver Brook | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Sun, Mar 29, 2020

| Merrimack Station Diversion to Merrimack River | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
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| 17:00 | | |
| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | 31 | 0.53 |
| 24:00 | | |

| Read Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Tilden Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
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| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Merrimack Station To Merrimack River | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | 31 | 0.53 |

| Read Station To Merrimack River | | |
|------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Tilden Station To Merrimack River | | |
|--------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Sun, Mar 29, 2020

| Walker Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Warren Station Diversion to Concord River | | | |
|---|-----------------------|----------------|---------------------|
| Time | Duration (Minutes) | Volume (MG) | Warren Rain (in) |
| 01:00 | | | |
| 02:00 | | | 0.02 |
| 03:00 | | | 0.02 |
| 04:00 | | | 0.04 |
| 05:00 | | | 0.03 |
| 06:00 | | | 0.02 |
| 07:00 | | | 0.01 |
| 08:00 | | | 0.01 |
| 09:00 | | | 0.02 |
| 10:00 | | | 0.03 |
| 11:00 | | | 0.06 |
| 12:00 | | | 0.01 |
| 13:00 | | | 0.09 |
| 14:00 | | | 0.10 |
| 15:00 | | | 0.02 |
| 16:00 | | | 0.01 |
| 17:00 | | | 0.04 |
| 18:00 | | | 0.02 |
| 19:00 | | | 0.02 |
| 20:00 | | | 0.02 |
| 21:00 | | | 0.20 |
| 22:00 | | | 0.08 |
| 23:00 | | | 0.01 |
| 24:00 | | | 0.01 |

| West Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
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| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Walker Station To Merrimack River | | |
|--------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Warren Station To Concord River | | | |
|------------------------------------|--------------------------------|-------------------------|---------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) | Total Rainfall (in) |
| | | | 0.89 |

| West Station To Merrimack River | | |
|------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Sun, Mar 29, 2020

Definitions and Abbreviations:

Flow Reporting Terms:

MG:

Volume in million gallons, (e.g. 2 MG = 2 million gallons)

MGD:

Flow rate in million gallons per day (e.g. a rate of 1 MGD sustained for 1 day would result in a volume of 1 MG)

Daily Flow Rate, million gallons per day (MGD):

Million gallons of flow treated at Duck Island

Peak Hourly Flow Rate (MGD):

The highest flow rate treated at Duck Island over a rolling one-hour period

Instantaneous Peak Flow Rate (MGD):

The highest flow rate treated at Duck Island at any moment of the day

Duration (Minutes):

Number of minutes in a given hour or over the course of the day a flow was measured

Weather Reporting Terms:

Rainfall Measurement:

Rainfall is measured by Lowell's network of rain gauges

Daily Rainfall, inches (in):

The total depth of rainfall measured by each rain gauge over the course of the day

Maximum Hourly Rainfall (in/hr):

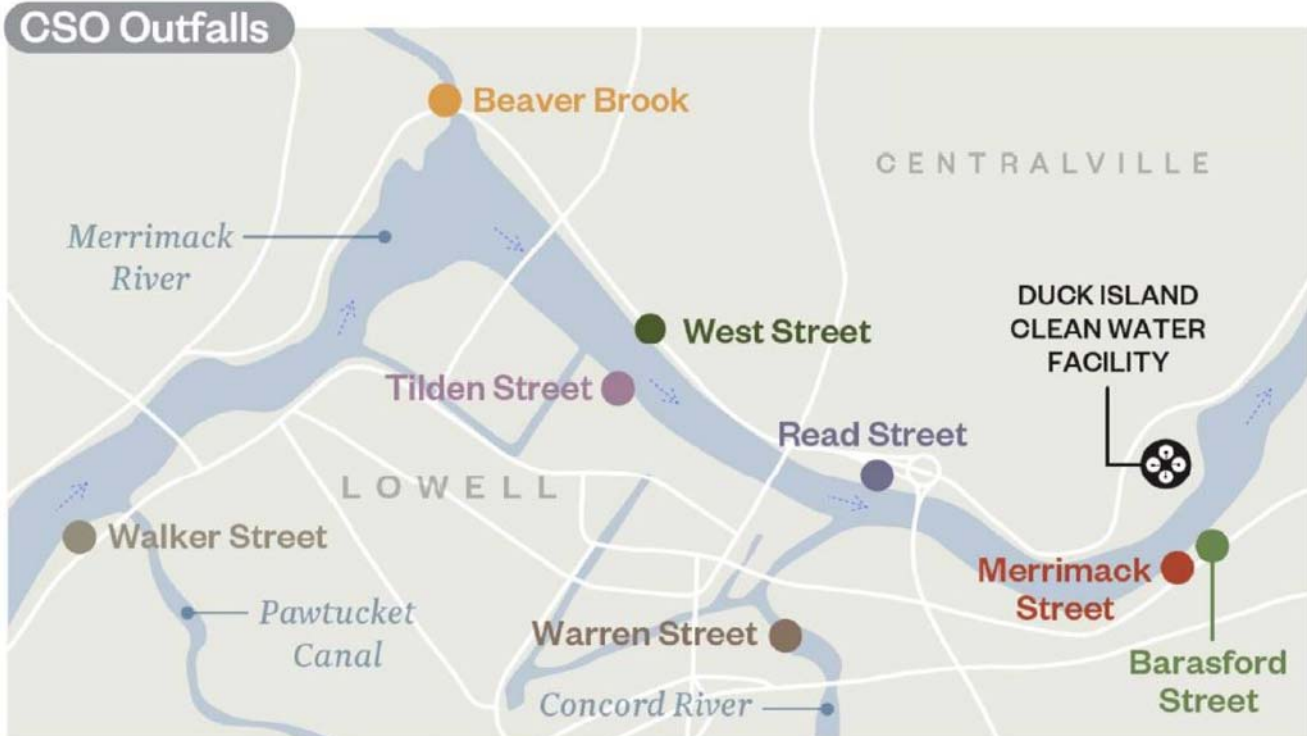
The greatest total depth of rainfall measured by a rain gauge in one hour

Peak Intensity, inches per 15 minutes (in/15-min):

The greatest total depth of rainfall received in any 15-minute period.

Duration (Hour):

The number of hours in the day during which it rained.



Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Mon, Mar 30, 2020

Dear Environmental Professionals and Interested Parties:

This report describes high-flow treatment performed at Lowell's Duck Island Clean Water Facility, as well as discharges of untreated Combined Sewer Overflows (CSOs) at the Utility's diversion structures.

High-flow treatment refers to combined stormwater and sewage that receives screening and clarification before being mixed with water receiving biological treatment. This mixture is then disinfected and discharged into the Merrimack River in full compliance with secondary treatment standards.

CSO diversions are an untreated mixture of stormwater and dilute sewage that is discharged directly into nearby receiving waters when the capacity of the treatment and transport systems are exceeded as a result of heavy rain. These diversions occur only when necessary to protect public health and safety.

Please refer to the final two pages of this report for an explanation of terms.

| Wastewater Flow to Duck Island | | |
|-----------------------------------|-----------------------------------|--|
| Daily Flow Rate (MGD) | Peak Hourly Flow Rate (MGD) | Instantaneous Peak Flow Rate (MGD) |
| 41.41 | 62.59 | 62.15 |

| | Rainfall | | | |
|--------------|---------------------------|---------------------------|-----------------------------------|----------------------------------|
| | Daily Rainfall (in) | Duration Total (hr) | Max Hourly Rainfall (in/hr) | Peak Intensity (in/15-min) |
| River's Edge | 0.14 | 7 | 0.05 | 0.02 |
| Warren | 0.15 | 6 | 0.05 | 0.02 |

Rain data may be inaccurate during cold weather

| High-Flow Treatment Summary | |
|--------------------------------|----------------|
| Duration (Minutes) | Volume (MG) |
| 282 | 2.72 |

| Combined Sewer Overflows Summary | |
|-------------------------------------|----------------|
| Duration (Minutes) | Volume (MG) |
| | |

Person Reporting Event: Gordon Bergeron - Lowell Water Engineering

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Mon, Mar 30, 2020

| High-Flow Treatment Duck Island | | | |
|------------------------------------|-----------------------|----------------|---------------------|
| Time | Duration (Minutes) | Volume (MG) | Warren Rain (in) |
| 01:00 | 60 | 0.75 | |
| 02:00 | 60 | 0.65 | |
| 03:00 | 60 | 0.65 | |
| 04:00 | 60 | 0.48 | |
| 05:00 | 42 | 0.19 | |
| 06:00 | | | |
| 07:00 | | | |
| 08:00 | | | |
| 09:00 | | | |
| 10:00 | | | |
| 11:00 | | | |
| 12:00 | | | |
| 13:00 | | | |
| 14:00 | | | |
| 15:00 | | | |
| 16:00 | | | |
| 17:00 | | | 0.02 |
| 18:00 | | | 0.03 |
| 19:00 | | | 0.05 |
| 20:00 | | | 0.03 |
| 21:00 | | | |
| 22:00 | | | 0.01 |
| 23:00 | | | |
| 24:00 | | | 0.01 |

| Barasford Station Diversion to Merrimack River | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
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| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Beaver Brook Station Diversion to Beaver Brook | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
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| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| High-Flow Treatment Duck Island | | | |
|------------------------------------|--------------------------------|-------------------------|---------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) | Total Rainfall (in) |
| | 282 | 2.72 | 0.15 |

| Barasford Station To Merrimack River | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Beaver Brook Station To Beaver Brook | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Mon, Mar 30, 2020

| Merrimack Station Diversion to Merrimack River | | |
|--|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
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| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Read Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
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| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Tilden Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
| 12:00 | | |
| 13:00 | | |
| 14:00 | | |
| 15:00 | | |
| 16:00 | | |
| 17:00 | | |
| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Merrimack Station To Merrimack River | | |
|---|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Read Station To Merrimack River | | |
|------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Tilden Station To Merrimack River | | |
|--------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Mon, Mar 30, 2020

| Walker Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
| 12:00 | | |
| 13:00 | | |
| 14:00 | | |
| 15:00 | | |
| 16:00 | | |
| 17:00 | | |
| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Warren Station Diversion to Concord River | | | |
|---|-----------------------|----------------|---------------------|
| Time | Duration (Minutes) | Volume (MG) | Warren Rain (in) |
| 01:00 | | | |
| 02:00 | | | |
| 03:00 | | | |
| 04:00 | | | |
| 05:00 | | | |
| 06:00 | | | |
| 07:00 | | | |
| 08:00 | | | |
| 09:00 | | | |
| 10:00 | | | |
| 11:00 | | | |
| 12:00 | | | |
| 13:00 | | | |
| 14:00 | | | |
| 15:00 | | | |
| 16:00 | | | |
| 17:00 | | | 0.02 |
| 18:00 | | | 0.03 |
| 19:00 | | | 0.05 |
| 20:00 | | | 0.03 |
| 21:00 | | | |
| 22:00 | | | 0.01 |
| 23:00 | | | |
| 24:00 | | | 0.01 |

| West Station Diversion to Merrimack River | | |
|---|-----------------------|----------------|
| Time | Duration (Minutes) | Volume (MG) |
| 01:00 | | |
| 02:00 | | |
| 03:00 | | |
| 04:00 | | |
| 05:00 | | |
| 06:00 | | |
| 07:00 | | |
| 08:00 | | |
| 09:00 | | |
| 10:00 | | |
| 11:00 | | |
| 12:00 | | |
| 13:00 | | |
| 14:00 | | |
| 15:00 | | |
| 16:00 | | |
| 17:00 | | |
| 18:00 | | |
| 19:00 | | |
| 20:00 | | |
| 21:00 | | |
| 22:00 | | |
| 23:00 | | |
| 24:00 | | |

| Walker Station To Merrimack River | | |
|--------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

| Warren Station To Concord River | | | |
|------------------------------------|--------------------------------|-------------------------|---------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) | Total Rainfall (in) |
| | | | 0.15 |

| West Station To Merrimack River | | |
|------------------------------------|--------------------------------|-------------------------|
| 24 Hour | Total Duration (Minutes) | Total Volume (MG) |
| | | |

Lowell Wastewater Utility

Downstream Notification Report

NPDES Permit No: MA0100633

Date of Event:

Mon, Mar 30, 2020

Definitions and Abbreviations:

Flow Reporting Terms:

MG:

Volume in million gallons, (e.g. 2 MG = 2 million gallons)

MGD:

Flow rate in million gallons per day (e.g. a rate of 1 MGD sustained for 1 day would result in a volume of 1 MG)

Daily Flow Rate, million gallons per day (MGD):

Million gallons of flow treated at Duck Island

Peak Hourly Flow Rate (MGD):

The highest flow rate treated at Duck Island over a rolling one-hour period

Instantaneous Peak Flow Rate (MGD):

The highest flow rate treated at Duck Island at any moment of the day

Duration (Minutes):

Number of minutes in a given hour or over the course of the day a flow was measured

Weather Reporting Terms:

Rainfall Measurement:

Rainfall is measured by Lowell's network of rain gauges

Daily Rainfall, inches (in):

The total depth of rainfall measured by each rain gauge over the course of the day

Maximum Hourly Rainfall (in/hr):

The greatest total depth of rainfall measured by a rain gauge in one hour

Peak Intensity, inches per 15 minutes (in/15-min):

The greatest total depth of rainfall received in any 15-minute period.

Duration (Hour):

The number of hours in the day during which it rained.

